Effects of partially substituting Sesbania hay for Berseem hay on Ossimi ewes' and their offspring's performance

Shaarawy, A.M., Mohamed, M. Y., Abd El-Hafeez, A. M., Nassar, M. I., and Mahgoub, A. A. S.

Animal Production Research Institute (APRI), Agricultural Research center (ARC), NC 12618, Dokki, Giza, Egypt.

ABSTRACT

This study aimed to evaluate the effect of adding 10, 20, and 30% Sesbania hay (SH) to diet at expense of berseem hay (BH) on productive and reproductive performance of Ossimi ewes post-lambing. Thirty-six ewes weighted 38.31 ± 0.91 kg 30d before lambing were used in a randomized complete block design with four experimental rations. Rations were formulated as follow: R_1 (60% concentrate feed mixture (CFM) and 40% BH) and served as control, R_2 (60% CFM + 30% BH + 10% SH), R_3 (60% CFM + 20% BH + 20% SH) and R_4 (60% CFM + 10% BH + 30% SH). Results demonstrated that feed conversion was somewhat lower with SH-containing rations. The treatment rations significantly increased blood urea-N concentrations. In addition, serum protein, cholesterol, ALT, and glucose concentrations were significantly ($P<0.05$) increased with R_4 compared to R_1. Treatments R_3 and R_4 led to a significant ($P<0.05$) decrease in milk yield. Replacing BH with SH by 30% resulted in a decrease ($P < 0.05$) in milk fat compared to other groups, while milk protein followed the opposite trend. First estrus post-lambing and estrus duration for ewes fed on SH was longer than for control. While SH supplemented rations decreased both P4 and E2 concentrations ($P<0.05$) compared to control. The economic efficiency was noticeably higher with SH-supplemented rations. Accordingly, it could be concluded that substitutions up to 30% of BH by SH have not left any adverse effects on ewes' performance, and metabolic parameters.

Keywords: *Sesbania, productive, reproductive performance, Ossimi ewes.*

INTRODUCTION

The lack of animal feed sources in Egypt is considered the major barrier to any further expansion in livestock production. There are around twelve million animal units and three million acres of fresh forage (**Hanafy *et al*., 2013**), sharing in feeding the existing animal population. According to the national strategy, in order to meet human demand, the area that is currently planted with wheat must be expanding at the expense of berseem (**Ahmed *et al*., 2017**). As a result, there is a conflict between the production of feed and food under very limited cultivation areas (**El-Talty *et al*., 2015**). Therefore, animals must be converted to feeding on unconventional feed sources partially replacing the common green fodder (**Moussa *et al*., 2011**). Furthermore, the common issue which called soil salinity could be limit plant development and biomass production, particularly in tropical, arid, and semi-arid regions (**Sabra *et al*., 2010**). Therefore, seeking for appropriate types of feeds for feeding animals in the current marginal lands of harsh conditions is necessary to overcome the acute shortage of feed in Egypt (**El-Nahrawy and Soliman, 1998**).

Sesbania sesban (SS) is now one of the exotic, multipurpose fodder tree varieties which have been introduced to help feed deficient status, preserve soil fertility, and limit land degradation (**Abebe, 2008**). Its botanical characteristics include rapid growth, reaching heights of 4-5 m in 6 months, deep roots, a single or multiple stemmed shrub or small tree of 1–8 m tall, pods that are typically 10–30 cm long, and 5–mm wide and contain 10–50 seeds per pod, leaves that measure 2–18 cm long with 6–27 pairs of leaflets (**Gutteridge and Shelton, 1998**). Cutting frequencies have been usually 3–4 cuts per year, although up to 8 cuts can be done in some places. Depending on the area, yields have ranged from 4 to 12 tonnes DM/ha/year. Additionally, cutting height might

Print ISSN : 2090-0368 - Online ISSN : 2090-0376 Journal Web site: https://ejsgs.journals.ekb.eg
Receive date: 1 April. 2022. Revise date: 1 May 2022, Accepted date: 24 May. 2022. Corrected and typeset date: 28 July.2022

affect yield, where 50–76 cm cutting heights, viable plant survival, and production have been prevalent (**Orwa *et al*., 2009**). It has demonstrated potential production as forage and can be included in the different grazing systems, whereas it grows widely as a wild plant on marginal lands and salt-affected soils in Egypt (**El-Morsy, 2009**). It can be planted in the desert as it does not need much water for irrigation and can grow on moderate rainy water. According to nutritional assessment, its leaves have high nutritional content where all nutrients could be digested (**Siaw *et al*., 1993**). The leaves of SS often have a CP content above 20%, and frequently even above 25% (**Gutteridge and Shelton, 1998; Orwa *et al*., 2009**). It has on DM base, 23.9% CP, 22.6% CF 6.% EE, 36.4% NFE and 10.6% ash (**Sabra *et al*., 2010**). Sesbania sesban's composition varies depending on the accession, stage of growth, frequency of cutting and harvesting, portions of the plant (leaves, seeds, stems, and twigs) used for feeding, chemical analysis, and soil characteristics, and land fertility condition (**Abebe, 2008**). In Egypt, sheep population are the third in terms of their contribution to the provision of red meat after cows and buffaloes, which are considered the strategic stockpile of food security that play an important role as a source of meat. In addition, sheep as a source of meat, milk, and wool can contribute significantly in solving the problem of animal protein deficiency, which is considered the most important food security problem for the country (**Aboul-Naga *et al*., 1981**). Around five million sheep have been living in Upper and Central Egypt as well as the governorates beyond the valley (Marsa Matruh, North and South Sinai, Red Sea, Nubaria, and New Valley) (**El-Malky *et al*., 2019**). Different physiological conditions in animal life, such as (pregnancy, parturition, and lactation) have crucial variable and obligatory modify their metabolism (**Iriadam, 2007**) and affects the levels of blood biochemical constituents (**Roubies *et al*., 2006**), used to evaluate the health and nutritional status of animals (**Antunovic *et al*., 2009**). Reproduction performance has been considered the most important and stressful period within the ewe's life cycle due to the high nutritional requirements for the fetus, colostrum, and milk production (**Sobiech *et al*., 2008**), where high energy and minerals are needed for milk synthesis. In this concern, the strategy of adding underutilized, inexpensive, less-competitive, and readily available protein sources like SS could be a practical substitution to reduce the lack of protein when poor-quality feeds are offered during the times of feed shortage (**Tekliye *et al*., 2018**).

Consequently, the current study's objective was to evaluate the nutritional approachable of Sesbania hay as a substitution for berseem hay on body weight, productive performance of suckling lambs, milk production, and its components, feed intake, feed conversion, economic efficiency, reproductive performances, as well as blood metabolites of sheep under the prevailing Egyptian conditions.

MATERIALS AND METHODS

The present study was conducted at Sids Animal Experimental Station, Beni-Suef governorate, which belongs to the Animal Production Research Institute (APRI), Ministry of Agriculture, Egypt.

Sesban (*Sesbania sesban*) hay preparation:

Sesban plants were cultivated and all agronomical practices were done properly and then manually harvested at recommended height and after that the biomass (leaves and stems) were spread out on clean plastic sheets and air-dried for 72 hours, turning three times a day, and then collected and stored properly until use.

Experimental design and animal feeding:

Thirty-six intact pregnant Ossimi ewes at 30 days before the expected date for their lambing were allotted randomly into four similar groups (nine each). The experimental period managed to evaluate the ewes' productive and reproductive cycle, i.e., parturition and lactation periods, until the weaning of lambs. A comparative feeding trial based on a randomized complete block design was used, in which the nutritional impact of the four experimental rations (partial replacement of Berseem hay (BH) with Sesbania hay (SH) on

blood parameters, productive and reproductive performance of lactating ewes were investigated. The nutritional requirements of all experimental groups were estimated according to **NRC (2007)**. The control group (R_1) was fed 60% concentrate feed mixture (CFM) + 40% BH up to the end of the experimental period. While group (R_2) fed 60% CFM + 30% BH + 10% SH, (R_3) fed 60% CFM + 20% BH + 20% SH, while (R_4) fed 60% CFM + 10% BH + 30% SH. Representative samples of CFM, BH, and SH were analyzed according to **A.O.A.C. (1995)**. Chemical analysis of different feedstuffs and calculated composition of the experimental rations are presented in Table (1).

Table (1). Proximate analysis of feedstuffs and experimental rations fed to Ossimi ewes on a DM basis (%).

Items	Chemical composition (%)						
	DM	OM	CP	EE	CF	NFE	Ash
CFM	90.14	94.15	15.55	2.89	11.55	64.16	5.85
BH	90.07	97.37	11.19	1.71	35.58	48.89	2.63
SH	91.20	92.87	18.95	2.66	31.18	40.08	7.13
R_1	90.11	95.44	13.81	2.42	21.16	58.05	4.56
R_2	90.23	94.99	14.58	2.51	20.72	57.18	5.01
R_3	90.34	94.54	15.36	2.61	20.28	56.29	5.46
R_4	90.45	94.09	16.13	2.70	19.84	55.42	5.91

CFM contained 24 % Cotton seed meal; 40% Wheat bran; 30% Yellow Corn, 1.5% Lime stone; 1 % Sodium chloride, 0.5% vitamins, and mineral mixture, and 3% Molasses

Milk yield, milk sampling, and analysis:

Every week of the experiment, the ewes were manually milked twice a day. Immediately after each milking in the morning and evening, milk samples were taken, and milk yield was recorded. Each ewe's milk sample was composited proportionally according to morning and evening quantities of milk yields. Total solids, protein, fat, and lactose concentrations were measured in milk samples using the Bentley 150 Infrared Milk Analyzer (Bentley Instruments, Chaska, MN, USA) according to **A.O.A.C. (1995)** procedures. Milk ash content was measured after being heated at 550° C for 8 hours in a muffle furnace. Fat-corrected milk (4%-FCM) was calculated according to **Sjaunja *et al*. (1991)**.

Estrus detection:

The oestrus activity was observed and detected for all Ossimi ewes by checking ewes' behavior (refusal or standing heat) after introducing a ram twice daily (**Sbadenov, 1985**).

Hormonal assays:

Once the ewe detected estrus, an individual blood sample was collected through the jugular vein from all ewes in the morning before feeding using 10 ml un-coagulated tubes. Serum was separated by centrifugation of blood at 1800 × *g* for 20 min and then stored at -20 °C till assay the concentrations of progesterone (P_4) and estradiol (E_2). Quantitative determination of P_4 and E_2 was applied using radioimmunoassay kits DSL-USA. Catalog No. 3900 (**Meizger, 1992**) using specific kits supplied by Diagnostic system laboratories. Inc., Webster, Texas, USA.

Sampling and analysis of blood serum:

Blood samples were taken from the jugular vein of three ewes per each group at the start of the experimental period and then monthly. Blood samples (10 ml) were taken before the morning feeding of each ewe into a clean dry tube without anticoagulants. Blood samples were centrifuged at 1800 × *g* for 20 min to get blood serum. Serum was separated into 2-ml clean dried Eppendorf tubes and frozen at -20° C for later analysis.

Determination of urea-N level was completed according to **Fawcett and Scott (1960)**, total proteins according to **Henry *et al*. (1974),** and albumin according to **Doumas *et al*. (1971)**. The concentration of globulin in each sample was obtained by subtracting albumin concentration from the total protein concentration. A/G ratio is calculated by dividing the albumin by total globulins. As described by Siest et al. (1981), glucose was determined, and cholesterol was measured according to **Rolschlau (1974)**. Serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were determined according to **Reitman and Frankel (1957)**.

Statistical analysis:

In accordance with **Steel and Torrie (1980),** the obtained data of measured parameters were subjected to a one-way analysis of variance using the SAS general linear model approach **(2001).** Significant means were separated using Duncan's Multiple Range Test **(1955).**

RESULTS AND DISCUSSION

Feed intake, feed conversion, and economic efficiency:

Results of average daily DM intake, feed conversion, and economic efficiency of lactating Ossimi ewes are presented in Table (2). The total DM intake tended to slightly decrease (1126.88, 1121.88, 1118.14, and 1110.63 g/h/d) with increasing the levels of SH (0, 10, 20, and 30%), but the differences were not significant. The present results are in agreement with those recorded by **El-Kholany *et al.* (2016)**. While **Khalili and Varvikko (1992)** reported that total DM intake decreased significantly as the degree of replacement of concentrate mixture by Sesbania forage increased. They reasoned this decline to the low palatability of Sesbania forage and its content of some anti-nutritional factors. The present study could be emphasized the attenuation of the harmful effect of these anti-nutritional factors of Sesban on DMI. **Kaitho *et al*. (1996)** reported that drying fodder trees reduces the odor and leads to improve palatability. In addition, **Mousa (2011)** demonstrated that drying fodder trees had interfered to reduce the harmful effect of anti-nutritional factors. Regarding the feed conversion, the obtained results indicated that feed conversion was the best with R_1 (2.57), followed by R_2 (2.66), then by R_3 (2.87), and the worst one for R_4 (2.95). However, data in Table 2 indicated that the total feed cost values (LE/ewe) decreased gradually (4.24, 3.97, 3.71, and 3.44) as a result of using SH at levels 0, 10, 20, and 30% in ewes' rations (R_1, R_2, R_3, and R_4, respectively). The total revenue/ewe were somewhat decreased to 4.38, 4.22, 3.98, and 3.77 (LE) for R_1, R_2, R_3, and R_4, respectively. Therefore, the highest net return/ewe (LE) was observed for R_4 (0.33), while the intermediate values were recorded for R_2 and R_3 (0.25 and 0.27, respectively), and the lowest value was occurred in the control group (0.14). Thus, the economic efficiency was higher with R_4 (0.10), followed by R_3 (0.07), then R_2 (0.06), and lastly, R_1 (0.03). These results might be attributed to the lower price of SH compared to BH. Accordingly, the relative economic efficiency was excessively higher (100, 200, 233.33, and 333.33%) with increasing SH levels in the tested rations (0, 10, 20, and 30%, respectively). The same positive effect of Sesban supplementation on economic efficiency was also observed by **El-Kholany *et al*. (2016)** and **Ahmed *et al*. (2017)** with lactating Zaraibi goats.

Blood parameters:

Data of some blood parameters are illustrated in Table (3). All blood serum metabolites were within the reference ranges **(Boyd, 2011)** for healthy goats. The results indicated that serum blood urea-N concentration tended to increase significantly ($P<0.05$) with rations that included SH (R_2, R_3, and R_4) compared to that of the control group (R_1). Similar results are in agreement with those obtained by **(El-Moghazy *et al*., 2017)** using adult bucks and also with those resulted by **(Farghaly *et al*., 2022)** using growing lambs. They reported that increasing protein utilization can stimulate blood urea-N concentration. The increased nitrogen produced from catabolism of its protein and amino acid catabolism with ewes fed SH-rations might result in an elevated serum blood urea-N, which was observed in supplemented rations with SH

compared to that of control one, yet this matter might support the assumption of **Ponnampalam *et al*. (2005)**. Furthermore, the increasing values of serum urea-N of Sesbania rations may be due to the rising level of NH_3-N in the rumen **(Mahgoub *et al*., 2022)**.

Table (2). Feed intake, feed conversion, and economic efficiency of Ossimi ewes fed the experimental rations.

Items	Experimental rations				±SE	*P*. value
	R_1	R_2	R_3	R_4		
FCM, g/d	437.83[a]	421.60[ab]	397.54[bc]	377.04[c]	11.47	0.0033
Daily DM intake (g/h/d):						
CFM	676.13	673.13	670.88	666.38	14.04	0.9672
BH	450.75[a]	336.56[b]	223.63[c]	111.06[d]	8.17	0.0001
SH	0.00[d]	112.19[c]	223.63[b]	333.19[a]	2.31	0.0001
Total DM intake	1126.88	1121.88	1118.14	1110.63	23.39	0.9672
Feed conversion[1]	2.57[b]	2.66[ab]	2.87[a]	2.95[a]	0.09	0.0288
Economic efficiency						
Total Feed cost/ewe/d, LE	4.24	3.97	3.71	3.44		
Total revenue/ewe, LE[2]	4.38	4.22	3.98	3.77		
Net return/ewe, LE[3]	0.14	0.25	0.27	0.33		
Economic efficiency[4]	0.03	0.06	0.07	0.10		
Relative EE%	100.00	200.00	233.33	333.33		

[a, b and c]**:** Means within each row with different superscripts are significantly different at (P<0.05)

Based on prices in the Egyptian market during the experimental period (2020) were 4600, 2500, and 300 LE/ton for concentrate feed mixture, berseem hay, and sesban, respectively. While, price of FCM = 10.0 LE/kg

[1] Feed conversion = Kg DMI : Kg 4% - FCM

[2] Total revenue/ewe (LE) = FCM × 10, assuming that the selling price of each Kg ewe was LE (10).

[3] Net revenue / ewe (LE) = Total revenue / ewe -Total feed cost/ewe.

[4] Economic efficiency = Net revenue /ewe (LE)/ Total feed cost/ ewe (LE).

Serum concentrations of total protein, albumin, glucose, cholesterol, and, ALT were significantly higher with the high-level SH-ration (R_4), but insignificant higher with the experimental rations of low or medium levels of SH (R_2 & R_3) than those of control one (R_1). High total cholesterol concentration was correlated to higher estrogen concentration in SH-supplemented groups as estrogen stimulates cholesterol synthesis (**Kaushik and Bugalia, 1999**). Concerning glucose concentration, it could be noticed that ewes received R_4 recorded significantly (P<0.05) higher value than that of R_1 and R_2. Glycaemia plays a vital role in regulating ovarian follicle responsiveness to gonadotropin hormone (**Selvaraju *et al*., 2003**). On the other hand, there were no significant differences among the dietary treatments respecting globulin concentration and A/G ratio. These results are in agreement with those reported by **Sabra *et al*. (2010)** on ewe lambs and **Ahmed *et al*. (2017)** on lactating goats. Generally, the high contents of crude protein and ether extract in SH reflected positively on total protein, albumin, cholesterol as well as glucose concentrations in the blood, and dependently did not have any adverse effects on milk production and composition (Table 4) as well as sexual activities of ewes (Table 6).

Regarding the blood serum ALT and AST concentrations in Table (3), data showed that AST level did not affect by different experimental rations. However, ewes fed R_4 ration recorded significantly (P<0.05) higher ALT levels than that of the control one. Therefore, this indicates no pathological lesions in the liver functions **(Pettersson *et al*., 2008).** Definitely, values are

within the normal physiological ranges thus substantially consider as an important indicator for normal liver activities and functions.

Table (3): Blood serum constituents of Ossimi ewes fed the experimental rations.

Items	Experimental rations				±SE	P. value
	R_1	R_2	R_3	R_4		
Urea (mg/dl)	164.75[b]	180.08[a]	181.86[a]	186.00[a]	5.54	0.0236
Total protein (g/dl)	5.34[b]	5.87[ab]	5.95[ab]	6.06[a]	0.22	0.0311
Albumin (g/dl)	2.97[b]	3.32[ab]	3.43[ab]	3.62[a]	0.18	0.0276
Globulin (g/dl)	2.37	2.55	2.52	2.44	0.20	0.9208
A/G ratio	1.25	1.30	1.36	1.48	1.33	0.7001
Glucose (mg/dl)	59.37[b]	61.45[b]	64.45[ab]	72.92[a]	3.24	0.0442
Cholesterol (mg/dl)	103.55[b]	110.34[ab]	116.13[ab]	122.75[a]	5.49	0.0247
AST (U/L)	82.45	80.08	81.86	85.91	3.22	0.1031
ALT (U/L)	40.25[b]	43.95[ab]	43.43[ab]	46.50[a]	1.46	0.0577

[a and b]**:** Means within each row with different superscripts are significantly different at (P<0.05)

Body weight changes:

Results presented in Table (4) showed non-significant differences among different experimental groups in the live body weight (LBW) of ewes during pre-lambing, post lambing, and at weaning times, as well as % of changes at weaning based on the LBW at pre-lambing. The main initial LBW at pre-lambing was approximately equal in all groups and ranged from (38.08 to 38.50 kg). Then there was a weight loss from ewes in each group post lambing (offspring weight) as compared to pre-lambing weights, ranging from 35.17 to 35.67 kg. These results could be associated with losing placenta, embryonic membranes, fluids, as well as lamb borns. LBW of ewes in all groups revealed again gradual raise towards weaning time in all groups. These data could be attributed to the utilization of nutrients for body recovery with subsequent body weight gain. These results may be indicated that feeding ewes on the present formulas with SH as a source of roughage up to 30% instead of berseem hay did not affect negatively the nutrient requirements of ewes up to 90 days post-partum. As a result of no significant differences in body weight and % of change, feeding on rations including SH succeeded to fulfill the required nutrients of ewes during lactation without any adverse effect on body weight. On the other hand, **El-Kholany *et al.* (2019)** reported that daily body gain and body weight changes of Zaraibi goats during the late pregnancy and suckling periods were significantly increased with increasing the level of Sesban seeds in the ration.

Table (4): Body weight changes of Ossimi ewes fed the experimental rations.

Ewes body weight (kg)	Experimental rations				±SE	P. value
	R_1	R_2	R_3	R_4		
Pre-lambing	38.50	38.33	38.33	38.08	0.91	0.9907
Post-lambing	35.67	35.50	35.33	35.17	0.84	0.9777
At weaning	38.83	38.67	38.65	38.37	0.73	0.9286
Change[1], %	0.86	0.89	0.83	0.76	1.40	0.9395

1: change at weaning based on pre-lambing wt.

Suckling lamb's performance:

Results of lamb birth weight, weaning weight, total body gain, and daily gain, as well as survival rate are presented in Table (5). Average LBW of lambs at birth (kg) tended to decrease but insignificantly (being 3.50, 3.44, 3.28, and 3.20 kg) with the increasing of SH levels (0, 10, 20, 30%) in ewes rations (R_1, R_2, R_3, and R_4, respectively). The same trend was observed with average LBW at weaning (kg) and total body gain (kg). The average daily gain was not significantly differed among treated groups. The survival rate was 100% for all lambs in all experimental groups. It is worth noting that feeding ewes pre-and postpartum periods on rations formulated with SH in replacing BH in this study could be saving some feeding costs without adverse effect on the growth performance of lambs produced.

Table (5): Growth performance of lambs suckled their mothers that fed the experimental rations.

Items	Experimental rations				±SE	P. value
	R_1	R_2	R_3	R_4		
Lambs birth weight, kg	3.50	3.44	3.28	3.20	0.10	0.1546
Weaning weight, kg	19.83	19.50	19.00	19.00	0.42	0.4451
Total body gain, kg[1]	16.33	16.06	15.72	15.80	0.48	0.7949
Daily body gain (g)	181.44	178.44	174.67	175.56	5.28	0.7946
Survival rate (%)	100	100	100	100		

1: Total body gian over a 90-d period

Milk production and composition:

The data of total milk yield, daily milk yield, and daily fat corrected milk, as well as milk components of lactating ewes, fed the experimental rations are presented in Table (6). Partial replacements of BH by SH (20% and 30%) in ewes' rations significantly decreased ($P<0.05$) the total milk yield, daily milk yield, and 4%-FCM yield based on those of control one (R_1). Otherwise, such values of previous items were insignificant decreases with low-SH-ration (R_2) compared with those of (R_1). These results are in agreement with those reported by; **Khalili and Varvikko (1992)** using Friesian × Zebu crossbred cows. These adverse effects on milk yield followed by SH inclusion might be due to the reduction of DM, CP, EE, and CF digestibility coefficients as recently recorded by **(Mahgoub *et al.*, 2022)**. It could be elucidated that the inclusion of a high ratio of SH with its contents of anti-nutritional compounds such as tannins and saponins may be limit its digestibility **(Woldemeskel *et al.*, 2001; Solomon, 2002)**. On the other hand, **Mekoya *et al.* (2009b)** reported that supplementation of *S. sesban* to lactating ewes resulted in a 13% increase in milk production compared to the unsupplemented one with concentrate portion. They added that this improvement in milk production might be due to using the concentrate feed mixture beside substantially more neutral detergent fiber and also, acid detergent fiber which supplied by *S. sesban* forage.

Although the inclusion of SH may have a limited adverse effect on daily milk yield (from 374.94 to 413.88 g) where these differences among experimental groups may be related to that Sesban hay contains phenolic compounds such as tannins and saponin **(Goel and Makkar, 2012; Chaturvedi *et al.* 2015)**, which may lower CH_4 production with increasing levels of SH. Phenolics, including tannins which can be mitigate CH_4 production by directly inhibiting methanogenesis and protozoa and reducing fiber degradation **(Patra *et al.*, 2012; Patra, 2016)**. Regarding milk composition, SH substitution affected protein content significantly ($P<0.05$), as R_4 recorded the highest value of milk protein compared with other tested rations and the control one. Both 10 % and 20 % SH inclusion in ewe's rations increased protein content but insignificantly compared to that

Print ISSN : 2090-0368 - Online ISSN : 2090-0376 Journal Web site: https://ejsgs.journals.ekb.eg
Receive date: 1 April. 2022. Revise date: 1 May 2022, Accepted date: 24 May. 2022. Corrected and typeset date: 28 July.2022

of the control ration. **Wilson (1984)** noted that dietary protein content directly affects milk protein content. This finding is in line with the supplementation of SH because it contains a high percentage of crude protein. While**,** milk fat percentage was significantly higher (P<0.05) in the groups fed R_1, and R_2 rations compared with that of R_4, which recorded the lowest value, but the fat percentage of the tested ration (R_3) didn't differ significantly from the others. Daily fat-corrected milk yield followed the same trend of milk fat. The better percentage of fat in milk for the control group may be due to the negative effect of the inclusion of SH on the digestion of CF **(Mahgoub *et al*., 2022)**. Regarding the impact of dietary SH on total solid (TS) in milk, no marked changes occurred among all groups. The highest ash content in milk of ewes fed SH has been attributed to that SH has higher ash content than that of BH in the control ration (Table 1).

Table (6): Milk production and composition of Ossimi ewes fed the experimental rations.

Items	Experimental rations				±SE	*P.* value
	R_1	R_2	R_3	R_4		
Total milk yield, kg	35.18^{a}	34.06^{ab}	33.01^{b}	31.87^{b}	0.70	0.0245
Daily milk yield, g	413.88^{a}	400.71^{ab}	388.85^{b}	374.94^{b}	9.30	0.0244
FCM, g/d	437.83^{a}	421.60^{ab}	397.54^{bc}	377.04^{c}	11.47	0.0033
Milk composition						
% Fat	6.63^{a}	6.57^{a}	6.27^{ab}	6.08^{b}	0.15	0.0447
% Protein	4.75 ^{b}	5.12^{b}	5.15^{b}	5.26^{a}	0.10	0.0226
% Lactose	4.12	4.10	4.07	4.03	0.13	0.9685
% SNF	9.57	9.65	9.92	9.91	0.21	0.5522
% Total solids	16.20	16.22	16.18	15.98	0.31	0.9468
% Ash	0.63^{b}	0.75^{a}	0.73^{a}	0.73^{a}	0.03	0.0149

a, b, and c**:** Means within each row with different superscripts are significantly different at (P<0.05)

SNF=solid not fat; TS= total solids

FCM= Milk yield (0.428 + 0.095 × fat %).

Sexual activity post-lambing:

Sexual activity post-lambing, including estrus post-lambing, body weight at estrus post-lambing, and estrus duration, as well as progesterone and estradiol concentrations on the day of estrus، are illustrated in Table (7). The interval from lambing to first clinical estrus was shorter for ewes fed on the control ration (59.17) compared with those fed on R_2 (62.50), R_3 (63.50), and R_4 (66.67) days, but the differences amongst them didn't significant. Also, the differences among the dietary treatments didn't significantly respect body weight at estrus post-lambing. Estrus duration (hour) showed an increasing trend (24.00, 28.00, 29.00, and 31.00) for control (R_1) and testedones(R_2, R_3 and R_4), respectively, with an increasing addition rate of SH despite the significant differences were only occurred between edges groups (R_1 and R_4). It was suggested that leaves saponin extracts might have the potential to elongate the estrous cycle **(Walekhwa *et al*., 2020)**. Serum concentrations of progesterone (P_4) in the intact estrous cycle remained at low levels in relationship to spontaneous luteolysis on the days of estrous. SH supplementation in ewes' rations had decreased P_4 concentration (P<0.05) significantly compared to that of ewes fed control ration, where values ranged from (0.78 to 0.86 ng/ml). The same trend was observed with serum estradiol (E_2) levels in the normal estrus cycle, which reached the peak value during the follicular phase on an estrous day. These results coincided with the earlier studies conducted by **Mekoya *et al*. (2009a)** with Menz ewes and **Sabra *et al*. (2010)** with native Egyptian ewes.

There was energy deficiency in supplemented rations with SH (R_2, R_3, and R_4) compared with un-supplemented one (R_1), as shown in Table 1, which can inhibit ovarian function at pituitary synthesis/release of gonadotropins that reflected on ovarian function in ewes (**McClure, 1994**). In supporting this point, **Kusina *et al*. (2001)** reported that does fed with a low energy level revealed a reduction in estrus symptoms. Moreover, negative energy balance decreases insulin growth factor-1, which is essential to ovarian follicular development (**Bossis *et al*., 1999; Butler, 2000**). Concerning protein, the higher protein in rations supplemented with SH (R_2, R_3, and R_4) compared with un-supplemented one (R_1), (Table 1), has a positive impact on ovarian performance as proved by (**Meza-Herrera *et al*., 2008**). Ewes fed BH had a better in some sexual activities post-lambing than ewes fed on SH (Table 6). Berseem (*Trifolium alexandrinum*) hay, is characterized by a high concentration of nutrients and β-carotene that are potentially beneficial for reproduction performance **(Feedipedia, 2013; Sharma & Murdia, 1974)**. Meanwhile, the use of SH seemed able to sexual development and activity of ewes as recorded in our experiment, due to the possibility of coming to an adequate amount of energy and protein in Sesban hay (**Mekoy *et al*. 2009a**). The study showed the non-adverse impact of Sesban hay inclusion on resumption of estrus post-lambing, body weight at estrus post-lambing, estrus duration, as well as, levels of progesterone and estradiol on the day of estrus. **Solomon (2002)** reported parallel trend as manifestations of the oestrus cycle started to reduce by supplementing Sesbania beyond 30% of the diet.

Table (7): Sexual activity post-lambing of Ossimi ewes fed the experimental rations.

Items	Experimental rations				±SE	P. value
	R_1	R_2	R_3	R_4		
Estrus post-lambing, day	59.17	62.50	63.50	66.67	4.59	0.7170
Body weight at estrus post-lambing, kg	39.00	38.83	38.50	38.33	0.53	0.8062
Estrus duration, hour	24.00^{b}	28.00^{ab}	29.00^{ab}	31.00^{a}	2.23	0.0158
Progesterone (P_4, ng/ml)	0.86^{a}	0.84^{b}	0.80^{bc}	0.78^{c}	0.03	0.0003
Estradiol (E_2, Pg/ml)	36.03^{a}	35.21^{b}	35.28^{b}	34.39^{c}	0.13	0.0001

[a, b and c]: Means within each row with different superscripts are significantly different at ($P<0.05$).

CONCLUSION

It could be concluded that substitution of up to 30% of berseem hay by Sesban hay didn't result any adverse effect on productive, reproductive performance, as well as the metabolic parameters which are reflected in the high economic efficiency of ewes rations and provisionary going beyond the cost and the availability of berseem hay.

REFERENCES

Abebe, M. (2008). Multipurpose fodder trees in Ethiopia; Farmers' perception, constraints to adoption and effects of long-term supplementation on sheep performance. PhD Desertation, Wageningen University, Wageningen, The Netherlands. 220p.

Aboul-Naga, M.A.; El-Shobokshy, A. S.; Marie, I. F. and Moustafa, M. A. (1981). Milk production from subtropical non-dairy sheep. 1. Ewe performance. The Journal of Agricultural Science, 97: 297-301. DOI: https://doi.org/10.1017/S0021859600040703

Ahmed, A.M., Abdelhamid, A.M., Fathia, A. Ibrahim and Sara, I.M. Grawish, (2017). Response of lactating Zaraibi goats to diets containing Sesbania and Kochia silages as a new and high source of protein. Int. J. Curr. Res. Biosci. Plant Biol., 4(10): 52-62. DOI: https://doi.org/10.20546/ijcrbp.2017.410.005

Antunovic, Z., Speranda, M., Steiner, Z., Vegara, M., Novoselec, J. and Djidara, M. (2009). Blood metabolic profile of Tsigai sheep in organic production. Krmiva, 51: 207- 212.

A.O.A.C. (1995). Official Methods of Analysis 15th Ed. Association of Official Analytical Chemists. Arlington, VA, USA.

Bossis, I., Wettemaann, R.P. and Diskin, M.G. (1999). Nutritionally induced anovulation in beef heifers: ovarian and endocrine functions preceding cessation of ovulation. J. Anim. Sci., 77: 1536-1546. DOI: https://doi.org/10.2527/1999.7761536x

Butler, W.R. (2000). Nutrition interaction with reproductive performance in dairy cattle. J. Dairy Sci., 60-61: 449-457. DOI: https://doi.org/10.1016/S0378-4320(00)00076-2

Boyd, J.W. (2011). The interpretation of serum biochemistry test results in domestic animals. Veterinary Clinical Pathology. Merck Sharp & Dohme Crop., A Subsidiary of Merck & Co., Inc.

Chaturvedi, I., Dutta, T.K., Singh, P.K. and Sharma, A. (2015). Effect of combined herbal feed additives on methane, total gas production and rumen fermentation. Bio-information, 11: 261–266. DOI: http://doi.org/10.6026/97320630011261

Doumas, B.T., Watson, W.A. and Biggs, H.G. (1971). Colorimetric determination of albumin. Clin. Chem. Acta, 31: 87.

Duncan, D.B. (1955). Multiple range and multiple F- test. Biometric, 11: 1-42.

El-Kholany, M.E., Maged, G.A., Behey, H.R., Aboul-Omran, M.A., Elsayed, F.A., Ibrahim, F.A. and Mona, A. Ragab. (2019). Productive performance, some rumen parameters and blood profile of Zaraibi does fed rations containing Sesbania sesban seeds a new and high source of protein during late pregnancy and suckling periods. J. Animal and Poultry Prod., Mansoura Univ., 10(1): 13-20. DOI: 10.21608/JAPPMU.2019.40301

El-Kholany, M.E., Maged, G.A., Ahmed, M.E., Abdel-Gawad, A.M., Aboul-Omran, M.A. and Al-Mowafy, A.A. (2016). Response of lactating Zaraibi goats to diets containing Sesbania sesban seeds as a new and high source of protein. J. Anim. And Poultry Prod., Mansoura Univ., 7(12): 507-513. DOI: 10.21608/JAPPMU.2016.48822

El-Malky, O.M., Mostafa, T.H., Ibrahim, N.H., Younis, F.E., Abd El-Salaam, A.M. and Tag El-Din, H.A., (2019). Comparison between productive and reproductive performance of Barki and Ossimi ewes under Egyptian conditions. Egyptian Journal of Sheep & Goat Science, 14(1): 61-82. DOI: 10.21608/EJSGS.2019.32573

El-Moghazy, M.M., Ahmed, M.E., Abu El-Naser, I.A.M. and Madi, A.M. (2017). Response of Zaraibi goat bucks to rations containing different ratios of Sesbania hay as a new and high source of protein. Egyptian Journal of Sheep & Goat Sciences, 12(3): 65-75. DOI: 10.21608/EJSGS.2017.26309

El-Morsy, M.A. (2009). Influence of cutting height and plant spacing on Sesbania sesban (Sesbania Aegyptiaca) productivity under hyper-arid conditions in El-Kharga oasis El-Wadi El-Gaded, Egypt. International J. Plant Production, 3(2) ISSN: 1735-6814. DOI: 10.22069/IJPP.2012.643

El-Nahrawy, M.A. and Soliman, E.S., (1998). Response of sesbania productivity and forage quality to seeding rates and planting dates. J. Agric. Sci., Mansoura Univ., 23(1): 11-17.

El-Talty, Y.I., Abdel-Gwad, M.H., Mahmoud, A.E.M., (2015). Effect of common reed (Phragmites australis) silage on performance of growing lambs. Asian Journal of Animal Science, 9, 1-12. DOI: 10.3923/ajas.2015.1.12

Farghaly, M.M., Youssef, I.M.I., Radwan, M.A. and Hamdon, H.A. (2022). Torpical Animal Health and Production, 54: 3-16. DOI: http://doi.org/10.1007/s11250-021-03006-5.

Fawcett, J.K. and Scott, J.E. (1960). Determination of serum urea. J. Clin. Path., 13: 156.

Feedipedia, Berseem (*Trifolium alexandrinum*), (2013).

Goel, G. and Makkar, H.P.S. (2012). Methane mitigation from ruminants using tannins and saponins. Trop. Anim. Health Prod., 44(4): 729-739. DOI: 10.1007/s11250-011-9966-2.

Gutteridge, R. C. and Shelton, H. M. (1998). Forage tree legumes in tropical agriculture. CAB International, Wallingford, 389.

Hanafy, M.A., Fahmy, A.A., Faraghaly, M.S., El-Shereef, A.A., (2013). Effect of different treatments on digestibility coefficients and nutritive values of kochia plant by sheep. Egypt. J. Nutr. Feeds. 16(2), (Special Issue), 257.

Henry, R. J., Cannon, D.C. and Winkelman, J.W. (1974). Clinical Chemistry, Principles and Technics, 2nd, Harper and Row, Publ., P. 415.

Iriadam, M. (2007). Variation in certain hematological and biochemical parameters during the peripartum period in Kilis does. Small Rumin. Res., 73: 54-57. DOI: https://doi.org/10.1016/j.smallrumres.2006.11.001

Kaitho, R. J., Umunna, N.N., Nahai, I.V., Tamminga, S., Bruchem, J.V. and Hason, J. (1996). Palatability of wilted and dried multipurpose tree species fed to sheep and goat. Journal of Animal Feed Science and Technology, (65): 151-163. DOI: https://doi.org/10.1016/S0377-8401(96)01092-9

Kaushik, H.K. and Bugalia, N.S. (1999). Plasma total protein, cholesterol, minerals and transaminases during pregnancy in goats. Ind. Vet. J., 76:603-606.

Khalili, H. and Varvikko, T. (1992). Effect of replacement of concentrate mix by wilted sesbania (Sesbania sesban) forage on diet digestibility, rumen fermentation and milk production in Friesian × Zebu (Boran) crossbred cows fed low quality native hay. Animal Feed Science and Technology, 36: 275-286. DOI: https://doi.org/10.1016/0377-8401(92)90062-B

Kusina, N.T., Chinuvo, T. and Muzanenhamo, S. (2001). Effect of different dietary energy level intakes on efficiency of anoestrous synchronization and fertility in Mashona goat does. Small Rum. Res., 39: 283-288. DOI: https://doi.org/10.1016/S0921-4488(00)00192-9

Mahgoub, A. A. S., Abd El-Hafeez, A. M., Mohamed, M. Y., Shaarawy, A. M., and Nassar, M.I. (2022). Efficiency of feeding Sesban hay as a replacement for clover hay on growth performance and semen quality of sheep. Adv. Anim. Vet. Sci. 10(7):1434-1443. DOI: https://dx.doi.org/10.17582/journal.aavs/2022/10.7.1434.1443

McClure, T.J. (1994). Nutritional and metabolic infertility in the cow. CAB international Wallinford, UK, p: 19-33.

Meizger, D.A. (1992). Sex steroids effects on the endometrium. Infertile Reproduction Med. Clinc. Amer., 3: 163-186.

Mekoya, A., Oosting, S.J., Frenandez-Rivera, S., Tamminga, S., Tegegne, A. and Van der Zijpp, A.J. (2009a). Effect of supplementation of *Sesbania sesban* on reproductive performance of sheep.

Livestock Science, 121: 117-125. DOI: https://doi.org/10.1016/j.livsci.2008.06.003

Mekoya, A., Oosting, S.J., Frenandez-Rivera, S., Tamminga, S. and Van der Zijpp, A.J. (2009b). Effect of supplementation of *Sesbania sesban* to lactating ewes on milk yield and growth rate of lambs. Livestock Science, 121: 126-131. DOI: https://doi.org/10.1016/j.livsci.2008.06.002

Meza-Herrera, C.A., Hallford, D.M., Ortiz, J.A., Cuevas, R.A., Sanchez, J.M., Salinas, H., Mellado, M. and Gonzalez-Bulnes, A. (2008). Body condition and protein supplementation positively affect periovulatory ovarian activity by nonLH mediated pathways in goats. Animal Reproduction Science, 106: 412–420. DOI: https://doi.org/10.1016/j.anireprosci.2007.06.004

Mousa, M.R.M. (2011). Effect of feeding acacia as supplements on the nutrient digestion, growth performance, carcass traits and some blood constituents of awassi lambs under the conditions of North Sinai. Asian Journal of Animal Science, (5): 102-117. DOI: 10.3923/ajas.2011.102.117

Moussa, H.M., Barghash, R.M., Hassan, A.A., (2011). The current situation of the animal feed gap in Egypt. Journal of Basic Applied Science and Research, 1: 713-720.

NRC, (2007). Nutrient Requirements of Small Ruminants: Sheep, Goats, Cervids and New World Camelids. National Academy Press, Washington, DC, USA.

Orwa, C., Muta A., Kindt, R., Jamnads, R. and Anthony, S., (2009). Agroforestry database: a tree reference and selection guide version 4.0. www.worldagrofrestry.org/sites/ tredbs/tredatbase.asp.

Patra, A.K., Min, B.R. and Saxena, J. (2012). Dietary tannins on microbial ecology of the gastrointestinal tract in ruminants. Dietary phytochemicals and microbes. Springer, Netherlands, pp 237–262. DOI: 10.1007/978-94-007-3926-0_8

Patra, A.K. (2016). Recent advances in measurement and dietary mitigation of enteric methane emissions in ruminants. Front Vet. Sci., 3: 1-17. DOI: https://doi.org/10.3389/fvets.2016.00039

Pettersson , J., Hindorf, U., Persson, P., Bengtsson, T., Malmqvist, U., Werkström, V. and Ekelund, M. (2008). Muscular exercise can cause highly pathological liver function tests in healthy men. Br J. Clin. Pharmacol., 65: 253–259. DOI: https://doi.org/10.1111/j.1365-2125.2007.03001.x

Ponnampalam, E.N., Egan, A.R., Sinclair, A.J. and Leury, B. J., (2005). Feed intake, growth, plasma glucose and urea nitrogen concentration, and carcass traits of lambs fed isoenergetic amounts of canola meal, soybean meal, and fish meal with forage based diet. Small Ruminant Research, 58: 245-252. DOI: https://doi.org/10.1016/j.smallrumres.2004.10.007

Reitman, S. and Frankel, S. (1957). A colorimetric method for the determination of serum glutamic oxalacetic and glutamic pyruvic transaminases. American Journal of Clinical Pathology, 28: 56-63. DOI: https://doi.org/10.1093/ajcp/28.1.56

Rolschlau, P. (1974). Klin. Biochem. 12: 226.

Roubies, N.; Panousis, N.; Fytianou, A.; Katsoulos, P.D.; Giadinis, N. and Karatzias, H. (2006). Effects of age and reproductive stage on certain serum biochemical parameters of Chios sheep under Greek rearing conditions. J. Vet. Med., A (53): 277- 281. DOI: https://doi.org/10.1111/j.1439-0442.2006.00832.x

Sabra, H.A., Hassan, S.G. and Mohamed, M.I. (2010). Effect of Sesbania sesban (*Sesbania*

egyptiaca) supplementation on the reproductive performances of Baladi sheep as compared to berseem (Egyptian clover). J. Reprod. & Infertility, 1(3): 66-70.

SAS (2001). SAS/STAT. user's guide for personal computer. Release 6.12. Statistics, SAS Inst. Inc. Cary N.C. USA.

Sbadenov, K. (1985). The effectiveness of different methods of detecting estrous in ewes. Vestirik Sel'Skohyaist Nauki Kazakhstana, 18960: 80-84.

Selvaraju, S., Agarwal, S.K., Karche, S.D., Majumdar, A.C. (2003). Ovarian response, embryo production and hormonal profile in superovulated goats treated with insulin. Theriogenol., 59(5-6): 1459-1468. DOI: https://doi.org/10.1016/S0093-691X(02)01196-2

Sharma, V.V. and Murdia, P.C. (1974). Utilization of berseem hay by ruminants. J. Agr. Sci., 83(2): 289-293.

Siaw, D.E.K.A., Osuji, P.O. and Nsahlai, I.V., (1993). Evaluation of multipurpose tree germplasm: the use of gas production and rumen degradation characteristics. J. Agric. Sci. Cambridge, 120: 319-330.

Siest, G, Henny, J. and Schiele, F. (1981). Interprétation des examens de laboratoire. Karger, Basel, Switzerland, pp. 241, 265-271.

Sjaunja LO; L Baevre; L. Junkkarinen; J. Pedersen and J. Setälä (1991). A Nordic proposal for an energy corrected milk (ECM) formula (EAAP Publication 50: Performance recording of animals: state of the art 1990. Centre for Agricultural Publishing and Documentation, Wageningen, the Netherlands. pp. 156–157.

Sobiech, P., Milewski, S. and Zdunczyk, S. (2008). Yield and composition of milk and blood biochemical components of ewes nursing a single lamb or twins. Bull Vet Inst. Pulawy, 52: 591-596.

Solomon, M. (2002). Evaluation of selected multipurpose trees as feed supplements in tef (*Eragrostis tef*) straw based feeding of Menz sheep. PhD Thesis, University of Berlin, Berlin, Germany.

Steel, R. D. and Torrie, J. H., (1980). Principals and Procedures of Statistics: A biometrical approach 2nd Ed. McGraw Hill Book Company, New York, USA.

Tekliye, L., Mekuriaw, Y., Asmare, B. and Mehret, F. (2018). Nutrient intake, digestibility, growth performance and carcass characteristics of Farta sheep fed urea-treated rice straw supplemented with graded levels of dried *Sesbania sesban* leaves. Agric. & Food Secur., 7: 77-86. DOI: https://doi.org/10.1186/s40066-018-0226-9

Walekhwa, M.N., Ogeto, T.K., Murithi, M.K. and Malago, Z.L. (2020). Pharmacological effects of *Sesbania sesban*: a systematic review. International Journal of Research in Medical Sciences, 8(3):1185-1194. DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20200803

Wilson, R.T. (1984). The Camel. Longman, London Kamoun, M.P. Girard, and R. Bergaoui. 1989. Alimentation et croissance du dromadaire. Effect d'un aliment concentre sur l'ingestion de matiere et la croissance du chameleon en Tunisie. Rev. Elev. Med. Vet. Pays Trop., 42: 89-94.

Woldemeskel, M., Tegegne, A., Umunna, N.N., Kaitho, R.J. and Tamminga, S. (2001). Effect of Leucaena pallida and Sesbania sesban supplementation on testicular histology of tropical sheep and goats. Anim. Reprod. Sci., 67: 253–265.

تأثير الاستبدال الجزئي لدريس البرسيم بدريس السيسبان على أداء النعاج الأوسيمي وحملانهم بعد الولادة

المعتز بالله محفوظ شعراوي و محمود يس محمد و أحمد محمد عبد الحفيظ و محمد إبراهيم نصار و عبد المنعم علي سيد محجوب

معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – الدقي – الجيزة – مصر.

هدفت هذه الدراسة إلى تقييم تأثير إحلال دريس السيسبان بمعدلات ١٠ و ٢٠ و ٣٠٪ في العلائق محل دريس البرسيم على إنتاج الحليب ومكوناته والأداء التناسلي لنعاج الأوسيمي ، وأداء نمو حملانها. تم اختيار ستة وثلاثين نعجة أوسيمي بمتوسط وزن أولي ٣٨.٣١ ± ٠.٩١ كجم قبل ٣٠ يومًا من الولادة واستخدمت في تصميم القطاعات العشوائية الكاملة بالأربع علائق التجريبية. تم تكوين العلائق الغذائية على النحو التالي: المجموعة الأولى (٦٠% علف مركز + ٤٠% دريس برسيم) وعملت كمجموعة ضابطة ، بينما كانت العلائق التجريبية الثانية (٦٠% علف مركز + ٣٠% دريس برسيم + ١٠% دريس سيسبان) ، والثالثة (٦٠% علف مركز+ ٢٠% دريس برسيم + ٢٠% دريس سيسبان) والرابعة (٦٠% علف مركز + ١٠% دريس برسيم + ٣٠% دريس سيسبان). بدأت تجربة التغذية في الشهر الأخير من الحمل، مروراً بالولادة ، واستمرت طوال فترة الرضاعة وانتهت بنهايتها.

أظهرت النتائج أن معدل التحويل الغذائي كان أقل إلى حد ما مع إحلال دريس البرسيم بدريس السيسبان في العلائق الغذائية. أدى إحلال دريس السيسبان في جميع العلائق التجريبية إلى زيادة مستويات تركيز اليوريا في سيرم الدم بشكل معنوي. بالإضافة إلى ذلك ، زادت تركيزات البروتين الكلي ، الألبومين ، الكوليسترول ، انزيم الانين امينو ترانسفيريز ، والجلوكوز زيادة معنوية مع المجموعة الرابعة مقارنة مع المجموعة الضابطة. أدى إحلال دريس السيسبان عند ٢٠٪ (المجموعة الثالثة) و ٣٠٪ (المجموعة الرابعة) إلى انخفاض معنوي في إنتاج الحليب. أدى استبدال دريس برسيم بـدريس السيسبان بنسبة ٣٠ ٪ (المجموعة الرابعة) إلى انخفاض معنوي في دهن الحليب مقارنة ببقية المجموعات الأخرى. في المقابل ، اتبعت قيم بروتين الحليب الاتجاه المعاكس لقيم دهون الحليب. بخلاف ذلك ، لم تتغير تركيزات اللاكتوز والمواد الصلبة الكلية و المواد الصلبة الغير دهنية بشكل ملحوظ مع المعاملات الغذائية. كانت الفترة من الولادة إلى الشياع الأول (يوم) للنعاج التي تتغذى على دريس السيسبان أطول من النعاج التي تتغذى على عليقة المجموعة الضابطة. وبالمقارنة ، أظهرت مدة الشبق (ساعة) اتجاهاً متزايداً مع زيادة مستوى إحلال دريس السيسبان في العلائق. بينما أدى إحلال دريس السيسبان في علائق النعاج إلى انخفاض معنوي لكل من تركيزات البروجستيرون و والاستروجين مقارنة بتركيزاتهما في المجموعة الضابطة. كانت الكفاءة الاقتصادية أعلى بشكل ملحوظ مع إحلال السيسبان في علائق النعاج. وفقًا لذلك ، يمكن استنتاج التالي أن استبدال دريس البرسيم بدريس السيسبان حتى ٣٠٪ لعلائق النعاج لم تترك أي آثار سلبية على الأداء الإنتاجي والتناسلي ، وكذلك المركبات التمثيلية الإيجابية التي انعكست على الكفاءة الاقتصادية العالية للعلائق التجريبية المشروطة بمدى تكلفة وتوافر دريس البرسيم.